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FORESTRY AND FARMING IN ONTARIO.

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T. B. WHITE.

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ARBORICULTURE AND AGRICULTURE.*

THE subject of this paper is "Arboriculture and Agriculture, or Forestry and Farming in Ontario," and the quotations given are mostly from books published since 1880, on these questions, by the Ontario Government, namely: The Agricultural Commissioners' Evidences and Report; Agricultural and Arts Association, and Agricultural College Reports; Forestry Reports by R. W. Phipps, Toronto; and Report of Delegation to American Forestry Congress. And in preparing this paper I have thought it best to divide it into four heads: 1st, Forestry and Rainfall; 2nd, Forestry and Drainage; 3rd, Forestry and Crops; 4th, Forestry for Protection and Ornament; winding up with some general statements, keeping the "text," which underlies the whole subject, until the last.

1ST. FORESTRY AND RAINFALL.

I am of the opinion that forests, more or less, in this part of Ontario—between the lakes, I mean—have not a noticeable effect on the rainfall, and I have been acquainted with some portions of it from a dense forest to ninety per cent. cleared, extending over forty years. Of over fifty answers to this question in Forestry Report for 1884, two or three say the rainfall is less since the forests have been cleared. The others all tell about the same thing as follows: "Though it may not be less on the whole, it does not seem to come as gentle and as often." But the way they harp on the known fact that creeks and rivers are more irregular, and small streams dry up where they used to run the summer through, it would seem that this had more to do with the conclusions come to than the actual facts of the case. Mr. Henry Doupe of Kirton, speaks clear on this point: "I must say there has been a drying up of the creeks since the forests have been cleared away—that is, the water goes away earlier in the spring, and is less in the creeks in the summer than formerly. When rain falls it gets away more quickly, which may be accounted for by open or under drains leading to creeks or small streams, and also from the effects of wind and sun on cleared land. As to the quantity of rain, I would say that I think it very little less than formerly. During the past summer, more rain fell here than in any season for the last thirty or forty years. When rain falls with thunder, I think,

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June 18, 1886. T. B. WHITE, Clarksburg.

for the time it lasts, that it falls more heavily than formerly. The land is mostly cleared."

Mr. Phipps says: "Of all the local causes which tend to produce rain, forests are by far the most beneficial to the cultivator, for the great but invisible columns of cold and moist air which arise from them are sent upwards when rain is most beneficial to the farmer, etc."

Mr. P. E. Bucke says: "The evaporation from their leaves by cooling the atmosphere, has the effect of increasing the frequency of showers"

A. Eby, M. P., says: "It is not proved that the total rainfall of a country is lessened by denuding it of its forests; but in a well-wooded country there is a more general distribution of moisture throughout the year."

Mr. Mowat, better known as Moses Oates, says; "That from 1841 till 1871, the rainfall in the second or third quarters of the year decreased; but during the last six or seven years, he thinks, the rainfall has been increasing. The causes of this increase are probably not due to anything peculiar to this province, but have their origin outside of the earth." Mr. Mowat gives himself plenty of room.

Now, the theory adduced to prove that trees have such a great influence in producing the rainfall is something like this, and which, if there is much truth in it, the farmer should study; 1st. Trees are composed of organic and inorganic substances; and to build up these elements into a tree water is the great promoter of the process; but by the time its mission is fulfilled it is at the top of the tree, and passes, by the process of evaporation, through the leaves, cooling the atmosphere. 2nd. The cooler the atmosphere the less moisture it will hold without precipitation. To illustrate: Supposing a current of air, or cloud, if you like, is passing along, having a temperature of seventy degrees, holding eight grains of moisture per cubic foot, but in passing over a cleared, parched country, the refraction from below increases that temperature, so that in place of raining it takes in more moisture, leaving the farmers' crops drier and drier; but, when it comes over a forest, the cooling process going on there reduces its temperature, say to fifty degrees, and the result is it rains. Applying this theory to the City of Toronto, and considering the material the buildings and streets are made of, and the sewers to swallow down the moisture as fast as it comes, thereby leaving but little for evaporation, should not the refraction from such a place, if it made any difference, have a tendency to give less rain than the rest of Ontario? But Mr. Monk says: "The average in Toronto has been for eight years or more, eight inches more than the average of the rest of the province. And the number of days on which rain fell was 110 to 91 to the rest of the province. From the same authority we learn the amount of rainfall in Ontario for

twenty-six years, from 1846 to 1871 inclusive. And, placing this rainfall alongside the amount of woods cut down during the same twenty-six years, we have the lowest, 26.805 inches in 1848, and the highest, 46.188 inches in 1870. And, putting the first four years given beside the last four years, it shows four inches more rain in favor of the latter.

Professor Brown says: "The well-watered north shores of Lakes Erie and Ontario, as far as Toronto, is clearly large lake influence." But he "cannot see how all north of Lake Ontario and the St. Lawrence River there is only a moderate rainfall, considering the size of the lake and the large proportion of heavily timbered country adjoining.

> And why the one should be so clear,
> And the other be so obscure,
> Is what *I* cannot see;
> But did *we* climb where Oates's did,
> It might be better understood,
> And solve the mystery.

Mr. McQuade, in his Essay on Forestry, makes a calculation from an experiment made ninety-seven years ago, and shows that an acre of wood land will yield 3,875 gallons of water in twelve hours; and gives it as his opinion, that if this process of calculation was carried out correctly in Ontario, it would be an easy matter to determine what amount of leaf-surface would be required to insure a full crop under ordinary circumstances.

Professor Brown, on this question, says: "This is just one of the things that we do not know, and that we are not likely ever to know, as a point for general practical guidance."

And there are several things, I think, which point very conclusively to the correctness of the professor's statement, though, of all that I have heard or read on forestry, Mr. McQuade, I think, in his "Essay on Forestry," carries off the palm. Hear him:

"In those days of universal tillage, the grass will burn off the earth, the cattle perish for want of water, and why? Because we have not the everlasting snow-capped mountains hanging over us to feed our creeks and springs; because we have destroyed our ferest-trees which Nature's Great Architect planted for that purpose. Do our people know all this? will they believe it when told? Oh that some mighty genius, with the tongue of Demosthenes, eloquence of Cicero, and pen of Homer, would proclaim it in every hamlet throughout the length and breadth of our fine young province, before it is too late. Twenty years ago the lover of sport could catch trout, bass, chub and suckers, at any time in summer, from Bayfield to Dublin, or shoot the grey or wood chuck. To-day there is not sufficient water in its whole length to keep a decent family in drink."

This seems rather small fry to make such a lamentation about.

No wonder at the poor Indian feeling so cast down and despondent over the loss of his buffalo.

2ND. FORESTRY AND DRAINAGE.

Mr. Phipps, after treating us to a philosophical lesson on the care of a flower-pot, says: "Let us compare this with the fields. While the forests remain in due amount, diminitive underground water-courses run every where beneath them. If you have ever dug a railroad cutting through a field, you will find under the wood many a spring. Under the field, unless you dig deeply, you will find but very few. The country, partially cleared, may be, I should say, likened to the occasienally watered and well-tended flower-pot. The fertilizing showers of spring and summer will, from the proximity of the trees, be frequent and nourishing. The overplus will at once be carried away by the underground channels, still for that purpose existing sufficiently near the surface; vegetation will flourish, and the fields yield a generous return. As with the well-tended flower-pot, the regular succession of moisture and heat has been bestowed. But when a country is almost deforested, the original underground channels must of necessity largely close," etc., etc.

However nice the forest plan of under-draining may look spread out on paper, it does not appear to have been very successful when the trees had possession of the land.

Mr. Elliott, of Colchester Township, Essex County, says: "We have about 8,000 acres of marshy land that has been reclaimed in our township by open drains. It was absolutely worthless before it was drained, except that in the middle of summer the cattle could run upon it for a short time. We have two drains, twenty feet wide, and three and a half feet deep on the average. Some have grown wheat on these reclaimed lands, which have evidently been timbered lands some time in the past, as the old stumps and timber can be found in the bottom."

The late Professor Buckland says: "I remember, in clearing up the old University Park in Toronto, where the soil in many places was very wet, we had a number of drains made, and the ground afterwards sown with grass seed; and wherever these drains were put, through dry as well as wet ground. the earth having been moved and the moisture getting in when the grass-seed was sown, little belts of green might afterwards be seen all through the driest summers for many years, indicating that we need not fear over-draining, so far as bringing the land into a good state, for the sustentation of crops, is concerned."

Mr. McLain, of Gosfield Township, says: "Some portions of our township have been reclaimed by drains. We have had a lot of bush land reclaimed. The wet land was generally kept in bush before it was drained—the driest land being selected for farming."

Mr. Cheekly, North Augusta, says: "With regard to clearing up the country, affecting the rainfall and drying up the streams, it is doing both. I remember distinctly, where mowers and reapers are now used, seeing water stand all summer, when the land was in a state of nature; and the stream that runs through the village where I live, shows signs of the supply being cut off, which it received in former years from the great swamps along its course that are now cleared up and under crop."

This seems a rather strange statement to make to show that the country is being ruined by being cleared up, and harvesting where water used to stand the summer through.

Mr. Woods, farm foreman at the College Farm, Guelph, says: "Field 12 will never be in a state of cultivation until well drained, as it is very low. There is an absolute necessity for having this field well drained. Nos. 17 aud 18 also require draining. I hope and trust the government will place a sufficient sum to the credit of the drainage fund to enable us to drain these three gelds."

But then Mr. Wood, in the same report, speaking of the new windmill, says: "The arrangement which regulates the supply is an ingenious piece of mechanism. When an animal commences drinking at one of the troughs, the machinery is again in operation, and continues so until there is no more water required. Thus at all times there is a plentiful supply of water on this part of the farm."

Mr. Wood's cry is more drainage and more windmills. Mr. Cheekly's cry is more trees and more wet land. This is farming and forestry.

Mr. Smellie, of Vaughan, gives his experience on both sides of the question; and as his is a pretty old farm—I was at a ploughing match on it forty years past—it would be well for most of us to take a note of it. He says: "The country is getting more cleared of timber, and that is another thing to account for the diminution in the crops. The more bush and shelter, the greater the crops of wheat, etc." Then, on under-draining, he says: "Under-draining has favorably affected the produce of my wheat. The cause of wheat being winter-killed is the fact of its having a cold, damp bottom."

If this is so, remove the cause, and the shelter is not needed. Putting a dozen coats on does not cure the ague.

Mr. T. H. Monk, after stating what is pretty well understood to be the cause of rust, says: "If this be so, it shows the necessity for drainage."

Mr. Gibson, of Markham, says: "When, in 1847, I first went upon my farm, it was a rather peculiar one. It was wet but not spongy, but quite unsuitable for raising fall wheat. But, after I had drained my farm, I had almost always good crops of fall wheat during the time the midge was at the worst."

Mr. Drury says: "Excessive moisture is not so bad for drained as undrained land, and that dry weather does not affect so bad."

Mr. Thomson, of Brooklin, who has spent some $3,000 on underdraining, says: "Before I drained, it depended entirely on the season whether I had any crop at all or not, and now a great crop is a matter of certainty."

The Directors of the Agricultural Society of West York say: "If we drain, the action of the air and frost will deepen the soil, and fall wheat and clover will not be so apt to kill out."

Thus we might go on *ad infinitum*, and show that a great deal of the failing of our crops, which we attribute to the want of shelter, is more for the want of drainage, and not such drainage as an increase of forests would give us either.

3RD. FORESTRY AND CROPS.

We shall run this head on the line of showing that our crops are not as much worse now as formerly, as we are apt to think they are; and when they are worse, it is often more attributable to bad farming than for the want of forests to shelter them.

Mr. Riddell, of Cobourg, gives a tabulated statement showing the nverage of his grain crops for thirty-nine years, from 1841, and the good and poor yields are so intermixed from beginning to end, so that if we attribute the poor crops of some years to the want of shelter, it is evident that this shelter did not cause good crops other years. In 1841, spring wheat 15 bushels; 1851, 27 bushels; 1861, 18½ bushels. In 1842, fall wheat 12 bushels; 1852, 29 bushels; 1867, 24 bushels; 1877, 25 bushels; and in 1878, 12 bushels per acre.

Professor Brown says: "I have adopted a rotation of crops, which I think is applicable to the whole province; and, although I have not been very successful in raising fall wheat, by reason of our high elevation and great exposure to the atmosphere, in spring wheat, which does not require the same amount of protection, my success has been very marked."

Although he gives the average of fall wheat for five years, from 1876 to 1880 inclusive, 35 bushels per acre; spring wheat, 17 bushels. Now, is not 35 bushels, for five years in succession, more the exception than the rule in a system of rotation of crops where the root crop gets the first pull at the manure? I think it is. In 1881, I see by the report, it is 38 per acre; in 1884, 18—and the reason given, it was very rusty—while spring wheat, for the same year, has gone up to 30 bushels per acre. This seems almost a contradiction to the requirement of protection so much for fall wheat.

And here it may not be amiss to note some of the drawbacks the farmer has to contend with, viz.: Too wet or to dry seasons, rust, midge, winter-killing of fall wheat, summer frosts, and sometimes too high temperature when the grain is forming; Hessian-

fly, wire-worm, joint-worm and blight. And experience and evidence tend to show that the best general protection against the first seven of these is a well cleared, open country, well drained and well farmed. For the next three, I would say, starve them out if there is no better way to get rid of them. As for blight, a change of seed is worth trying.

Professor Brown says, the principle cause of success generally is good farming, and is of the opinion that the yield of wheat is steadily on the increase, caused by more root growing and cattle raising. And that well drained land holds moisture longer than any other land, only it holds it more evenly, saves time by being able to get onto it earlier in the spring, hastens the harvest, increases the nutritive value of grains, renders water more pure, and improves the general health of a district.

With respect to shelter for fall wheat, the professor says he has not had much experience; but believes that in the northern portion of the province fall wheat is more successful than in the southern portions, simply because of greater protection afforded by a greater bush area.

Mr. Douglas, St. Vincent Township, says: "The reason that fall wheat was not grown so extensively was that it was very apt to get winter-killed, until these last few winters, when it has stood very well. It stands the winter now (1880) better than it did ten years ago." He attributes this to there being more clearing; the snow is not so heavy, which used to kill it, and, as the land gets older, it is not so subject to wet.

Mr. Hobson, of Mosborough, says: "When the country was wooded, we used to have pretty good crops of fall wheat, but in the northern part of Wellington, when the country was wooded, they could not grow fall wheat, and since the woods have been cleared they have been very successful in growing fall wheat."

So here are two opposite results. I think the land in the north and the south are pretty much the same." Mr. Drury is strong on protection for fall wheat.

Mr. Dickson, of County of Huron, says: "I cannot give the reason why fall wheat is more productive and a surer crop than it was a few years ago."

Mr. Stephen White, of County of Kent, says: "They have had no failure of the fall wheat crop for several years, and it never was better in the county than it has been for the last three years; and thinks the average would be greater if the cultivation was better; and knows of cases where proper methods of cultivation have brought an average yield of 40 to 45 bushels per acre.

Mr. Iler, County of Essex, says: "The growth of fall wheat is increasing in our county, and it is producing larger crops."

Mr. T. L. Pardo says: "I follow a system of mixed farming. I had the present year 46 acres in wheat, and it yielded 35½ bushels per acre."

Mr. Gibson, of Markham, gives a long evidence on his system of farming, without once using the words woods, trees or forests. He seems well satisfied with both system and results. He says he found the farm in a bad state with stumps and frog ponds. Query. Did the trees have the ponds for the sake of the music? However that may be, Mr. Gibson has come to farm and the stumps must go, and the ponds be drained; the frogs apparently not taken into account at all. When, after 13 years of labour, in 1860 he has the land ready to commence a seven years' *rota* of croping, or eight years, including the summer fallow which he ploughs five times, harrows five and grubs three, puts on 105 loads of manure, some salt, and sows with fall wheat. Yield of wheat, 40 bushels per acre of extra quality. Then follows barley, three years grass, peas, and last, oats. This is a ten acre field. Total profit for the seven crops, $874.50, after allowing for rent, manure and labour, $1,170.50; total proceeds for the seven crops. $2,045.00. A thorough summer fallow, Mr. Gibson says, is the basis of this profit, and that "this rotation keeps the land perfectly clean and free from rubbish, while a great many farms are overrun with thistles, and there is an act upon the statute book to keep them from spreading; but this is a better means of getting rid of them than any statute."

Mr. Phipps says: "When the woods are gone the land will not yield so rich nor so easily produce a return. To farm will be a labour more and more slavish, for the farmer will be working against nature. He will have interrupted the course of the means by which she aids him in his toil, moisture being retained in the forest's bed in millions of tons for the benefit of both field and forest in a drier time."

In the north of Illinois, west of Rock River, is a piece of country known by some as the garden of the world. When settled about fifty years ago it was a treeless prairie, but had a very rich and natural drained soil; so much so, that cellars have no need for drains, and running streams are few and far between. If these underground channels were caused by forests, they are remaining open a long, long time. For the first thirty years they used to grow wheat, when it commenced to not do so well, and kept getting worse, until, when I was there in 1881, they had for some time quit it altogether. I felt a little surprised when along with a farmer, and he stopped at a store to get some flour to take home. He had 120 acres as beautiful land as I ever saw, and had produced no want of wind-brakes by planting osage, orange and willow hedges. Now, here we have the very opposite to Ontario from beginning to end, with the same results, if not worse, in respect to the failing of crops Here the wire agent can come around and say: "Those wind-brakes of yours will never do; you used to grow good wheat before you had; get rid of them; build wire fences, and let the air have its free course; you are working against nature."

In Ontario the tree agent can come around and say, especially this spring: "Your fall wheat I see is about gone; this clearing too much of the forest is going to ruin the country; there is nothing for it but to plant outtrees very extensively, and produce plenty of shelter; you are working against nature."

Mr. Phipps says: "Proprietors should remember that no one can possess a title to destroy the usefulness of the soil, lest the land cry out against him, and the furrows thereof likewise complain. The vast concourse of humanity continually emerges from the unknown past; it travels toilsomely by; it passes into the clouds of the future; be sure that there we shall meet with stern questioners; nor will those pass unchallenged who have to serve their temporary greed, rendered painful, sterile and barren, the path of generations yet to come. Baa! why, the man who clears up a bush-farm, lives of it and raises a family, cannot, no matter how hard a case he may be, but leave it much better for the next generation than he found it."

Mr. Wiser, M.P., says: "That when he purchased his farm, it was so impoverished that it did not produce anything in comparison to its present yield; but by the manure which has been put on the farm, 28 acres would produce more than the original farm which was 333 acres."

Mr. McQuade says, in his Essay on Restoring Poor Land: "That as long as it will grow a decent thistle or burdock, it can be made all right by proper management, and pay wages."

Mr. Thomas Leslie, grandson of Mr. and Mrs. George Leslie, of Township of Chinguacousy, says in an address to them at the celebration of their diamond wedding: "In hewing out of this home, from which you have never been absent for sixty years, day or night, save at the call of duty to your children or your friends, we know you must have endured difficulties and toils of the severest, of which we can only try to form an opinion, but your perseverance has been crowned with success. A similar changing of the forest to fruitful fields, by neighbours around, must have been both pleasing and encouraging to you."

4TH. FORESTRY FOR PROTECTION AND ORNAMENT.

I do like trees, though I cannot say that they used me too well when they had the upper hand. The first morning I went to chop on my lot, we had only potatoes for breakfast; the black smutty flour we should have had to make a cake of, was on a jumper, wrecked against a tree in another part of the township; and it is no fun to have to attack big trees with your ammunition in possession of other trees far away. However, we had some home for dinner, and I picked up again.

Mr. Dempsy says: "Who can compute the increase in value of every farm in the province, when our country roads shall have

become avenues of stately trees, and our rocky fields and broken hillsides are covered with profitable timber."

In England the hedges have to be kept down to about four feet along roads, to let the wind and sun in on them. Avenues of trees are very well in their places, such as parks, short stretches about residences, etc.; but rarity as well as distance tends to enchantment. If we had perpetual spring or summer, we would not have near the enjoyment we have with our changeable climate:

"Stately and fair is the vessel
That comes not near our beach,
Stately and grand is the mountain
Whose height we never may reach."

When riding along a road with a farmer in Illinois which was shaded by a great willow hedge, he remarked that it spoilt the road by keeping it wet, and he thought it would be better cut down, and was of the opinion that if wire had been in use when it was planted, there would not have been near so much of it done as there was. We also passed a willow grove which his father had planted, but had changed hands and was being cut down. Jean Inglelowe sings:

"The roses that in yonder hedge appear
Out-do our garden buds that bloom within;
But since the hand may pluck them everywhere,
Unmarked they bud, bloom, drop and drift away."

And the following incident which occurred before a bench of magistrates on February 18th, 1886, at her native town, Boston, England, seems a fit accompaniment to the song: "Thomas Morley, farmer, Bicker, was charged with being the owner of land on which a certain hedge is growing, adjoining to a carriage-way, and neglecting to cut a plash in said hedge, so that sun and wind are excluded from the said carriage-way. The defendant said that he had commenced to cut the hedge; an order was made for the cutting to be completed, defendant to pay costs."

The late Prof. Buckland and a number of others put considerable stress on the advantage of leaving woods, or if too late for that, planting wind-brakes on the north and west sides of farms, implying that they do not want them on the east and south sides But is this not reversing the golden rule with our neighbours, and giving them what we do not want ourselves.

Mr. McFarlane, Dover, Kent, says he is farming 400 acres of land which he has cleared, and has kept standing the timber on the north and west sides of his farm, and finds it beneficial, so intends to continue to preserve the young timber in belts to shelter his fall wheat in winter and early spring, but his neighbours have not generally followed this plan. Query: Do his

neighbours have a different opinion of his shelter on account of being the other side of it? However, as Mr. McFarlane says he has not been able to successfully drain his land, we cannot blame him for doing the next best thing to save his wheat.

Mr. Leslie gives a statement showing what will make a good sheltered belt on the north and west sides of a ten acre field. But, to carry this out, we would have all our ten acre fields belted all round, and which would, I think, about half ruin the country for growing grain. If we had sufficient to go round one field, or two, and could handle them as handy as we do our blankets—have them just where we wanted them, and when we did not want them, roll them up, it would make all the difference.

Mr. Nicol, whose essay on Forestry was awarded first prize, says: "On all mountain ranges, on abrupt hill-sides, along the borders of streams, lakes and water-ways, in swamps, in groups, and belt surrounding farms, in every village, around every rural cottage, school-house, and church, on the sides of highways and and rail-roads, in cemeteries, public parks, and squares, the growth of forest trees should be promoted by protection, and by planting where they do not spontaneously grow." This statement would be amended, I think, by striking out the words, "lakes, swamps, and highways," and in place of farms, say orchards, buildings, and pastures. If the swamps in the townships of Colchester, Gosfield and Mersea, in the county of Essex, had been planted with trees in place of being drained, what would they be now in comparison to what they are.

Mr. Elliott, of Colchester, who mentioned about the drowned trees, says: "Our county is very healthy at the present time, and we scarcely ever hear of any ague since the land has been cleared up and drained." And of the township of Mersea, he says: "It has spent $150,000 in drainage, and to-day it is the best wheat growing township in the county."

"Mr. McCain, speaking of the big marsh in Gosfield, says that draining has increased it in value from 50 cents to 50 dollars per acre, and is now excellent land for corn, clover, and fall wheat."

Mr. Gordon Mowat says: "I attribute the extraordinary prevalence of summer frosts in the neighborhood of Newmarket entirely to the swamps, which chill the atmosphere for miles around. The clearing of forests does not prevent frosts so much as the draining of swamps and marshy lands. Drainage is the real secret of improving the temperature of a district."

The heavy frost we had June 6th, 1881, was felt the worst by both fruit and crops where they were most sheltered from the wind. As for shelter from the lakes, the farms here most exposed to the winds off Georgian Bay, either by being near the beach or on mountain tops, jutting out almost over the bay, are the most successful in raising wheat, especially spring wheat. The only crop of wheat (spring) we ever had that was not worth

threshing, was grown in a ten-acre square, surrounded by a dense wood, in 1848; and though I do not think the woods were the cause of the failure, I am sure the woods did not save it. And planting trees along railways. it seems, can be overdone. In northern Italy we are told the traveller is discomforted from the abundance of trees planted. So much so that the eyes grow weary, and close upon the scenery they cannot enjoy. This would seem worse than underground railways, for there the traveller expects to see nothing and is not disappointed. And now, with respect to a few general statements. One is, that this Forestry and Farming question is not too well understood, and that too many who think they know, and write about it, simply drift away into one-sided theories and imaginations, and the only conclusions which they arrive at are that the trees are our main producers of the rainfall, and that swamps are necessary reservoirs to hold and let go this rainfall gradually, as required, to keep the streams and rivers uniform the summer through, while the farmer's interest is to hurry away this rainfall as fast as he can. For this object we turn-pike our roads, make culverts, ditches and drains, run water furrows, in fact do anything rather than have the water standing on the land. Then, when the winter and spring moisture is pretty well out of the land, it will take in an ordinary summer shower, and utilize it to the benefit of the growing crops, without raising the brooks sufficient to supply the frogs. And this is the reason why so many are inclined to think that as the forests disappear the rainfall is less. It is interesting to read the correspondence on this question in Forestry Report for 1884, on pages 19, 20, 21, 22, and 23, then on page 24, Mr. Phipps says, apparently with all seriousnesss, "The reader will observe that a great number of experienced men give it as their opinion, that the over-clearing of the forests in Ontario is drying up the surface of the land. The numerous underground channels fed by the forests, which formerly flowed near that surface, giving life to the earth, and enabling, in dry seasons, the roots to obtain that moisture below which the parching skies deny above, have receded to a much greater depth." This philosophy seems at variance with the principle of under-draining. Another strange thing in connection with this forest rainfall is, that if Prof. Williams, in 1789, was so far advanced in this science as to seal in a bottle two leaves and a bud of a maple, attached to the tree, and find the expired water to be sixteen grains in 6 hours, that none of our arboriculturists have not gone a step further since then, and sealed a blade of grass or corn, a turnip leaf or a pea vine, or something else in a bottle to ascertain what amount of water they expire in a given time, and allow this as a set-off against what they say we lose by clearing the forests. When reading McQuade's Essay on forestry, and come to the words, "The tree, like every other vegetable, is made up of two kinds

of substances, organic and inorganic, etc." I did think that he was going to give a credit and debtor account, but no, it is all loss account; suckers and everything gone. Supposing we were a little, diminutive race of people, and could live in a turnip field, running about under the tops, having our houses in the bulbs, would we not find ourselves greatly protected from the heat of the sun or the stormy blast, and, on the dewey morns remain in our little houses while the leaves dropped moisture on the land, and be singing, "Here is the home of retirement, the seat of contemplation, the birth-place of thought. He who has near him such a solitude, may rear heroes, for the murmuring of the mighty turnips roll with the wishes of ambition to the youthful ear, etc." Dr. F. B. Hough attributes the drying up of the streams to the clearing of the forests; then goes on to prove it by showing what a deciduous tree does in producing moisture, and about forests dribbling it out from springs, and swamps which give rise to rills and streams. Now, this way of water percolating through the land from swamps and such places, seems to be what makes so much under-draining required before land can be farmed to any comfort or profit. It is too cold a process of supplying moisture, being quite the reverse to what is known as irrigation; and what the practical farmer designates as land "too wet and cold." This may be all true enough about the deciduous tree, but then it is a very inconvenient vegetable to grow amongst grain crops, and if the doctor had given us some idea of what the latter does in the way of providing moisture, it would seem more to the point as coming through the Agricultural Commission.

Farm crops are produced by the same process as forests are, and consequently must have a similar effect on the moisture of the atmosphere, and, if a field of grain will produce a close vegetation four feet in height in one season, which seems more than a forest does, and the moisture and cooling process be in proportion to the work done, what is the result? Well, I really don't know, but I do think we never had more rain than we had last spring, summer, and fall; yet, a spring on the rear of our lot which used to run all summer before the woods were cleared, and I used to think what a fine place it would be for water when the land became pasture, dried up early and remained so through the summer. But the reason is, that a piece of low land that used to hold water all summer and supply this spring, has been cleared and drained, and I have actually seen a self-binder working on said land. Well may we ask what are things coming to.

Prof. Brown says: "I see no great future for Manitoba and our North-West, unless extensive systematic forestry precedes. *A peopled agricultural country is an impossibility without trees.*

The *Globe* says, speaking of those lands, "Their fertility and climatic fitness for profitable agriculture has been proclaimed

with one voice by explorers. Investigation has widened the area of good land so remarkably that the public imagination is much occupied with calculations respecting the countless millions that the countless rich acres will support."

Our latest school geography teaches that "It is remarkable, that about the centre of the Dominion of Canada, along the Saskatchewan valley to the Rocky mountains, the climate is almost the same as in Ontario, although ten degrees higher in latitude, or nearly 700 miles further north.

These statements seem to argue a preference for grass to forests for ameliorating the climate and the making of good land.

Holland is a low, flat country, entirely destitute of hills, rocks, or forests, and uses its canals for roads, yet, it is termed a dairy farm, and its horticulture has attained to great perfection and sustains a population of 311 to each square mile, while from no country do we hear less about poverty and want.

Scotland with all its hills and dales and rocks and forests, only sustains a population of 122 to each square mile. And it would seem that from the accounts lately, too many are little better off now than was Mr. Ross when Hugh Miller paid his son a visit and Mrs. Ross busied herself to get up as nice a dinner as she could for the occasion. And what was it? Potatoes and salt, backed by a pitcher of water.

Mr. Phipps says: "The forests are virtually no more; all is swept by the bleakness of the winter storm; all is dried and scorched by the summer wind and the summer sun." On the other hand we are told that one Nesser found that a tilled soil lost only one-third of the water that untilled did, and that a tilled soil was drier at the top than an untilled soil.

Prof. Stockbridge, of Amherst, in his trials, found that a box of clay stirred every day to the depth of four inches, lost in seven days at the rate of 904 barrels, and untilled soil at the rate of 1,070 barrels.

Dr. Sturtevant in his trial with boxes, found that untilled soil lost 1,243, and tilled soil only 1,060. I have seen it lately stated in the papers that the rain belt is following the plough in Colorado towards the Rocky Mountains. But to come nearer home, Mr. W. L. Brown, Hyde Park, says: "I know land in London Township which was considered sterile and worn-out, which, by drainage and thorough culture, brought forth good crops." And anyone who has done justice to a summer fallow, will have noticed that somehow or other it does not dry out like untilled soil. Now this tilling of the soil implies letting the wind and sun into the land.

Mr. John Campbell, of Woodville, says, after following a mixed system of farming: "The result is that my farm is now worth, I believe, a fourth more than eight years ago; that is to say, the same amount of labour will produce a fourth more crop, and

nearly all is due to the improved quality of manure." "If," he says, "we feed our farms, they will feed and also clothe us well in return."

From such experience as this in tilling the soil, is it any wonder that the forest enthusiasts have to complain of the tardiness of those who have cleared the land, in falling in with their utopian ideas about the country being destroyed, about our seasons being changed, about the rains not coming so often nor so gentle, and so on. That there is a great variation in the seasons, we all know. This spring, with the least woods we ever had, has been as early and fine and the rains as gentle, if not more so, than any spring for 40 years; while last spring was a late one, with cold and heavy rains. In 1864, with a great deal more woods than now, we had in May three cold rains a week apart, each rain finishing with snow; and the year before, 1863, May was a summer month. In 1847, when this part was about all woods, there was a heavy snowstorm on the 15th of June. In the College Report for 1884, we learn that for the months of August, September, and October, the number of days on which rain fell, were 10.12 and 10 respectively; while the year before, for the same months, they were only 2, 6, 6; but that about as much rain fell in the six days of September as in the twelve the year after. These differences, just one year apart, seem to spoil the theory that the trees are such an important factor in regulating the weather.

Mr. Phipps would press on all owners of farms to make a shelter belt broad enough for a small forest on the most exposed sides to keep off the winds. This might seem very nice on cold windy days, but it is not on such days the farmer has to be working out so much as on warm sultry days—and to be haying and harvesting in hot weather under the lea of a forest is anything but desirable, besides the great difficulty often in securing crops in good condition where you cannot have the wind to help to dry them.

Forestry and farming are two things, and either, to be a success, require to be pretty well separated. And while most places can have a good many trees to advantage if judiciously arranged, to act upon the advice of some persons, there would soon be a much greater mistake made than has been in what they term the over-clearing of the forests. The first raising I was at in this Township (Collingwood), it came on a storm, and when the trees commenced to crash down, the stampede that was made for a small chopping there was, showed everyone to be minding his own business. In the run I lost my hat, and had to put my head under a log to save it from the hailstones. "Say not thou, what is the cause that the former days were better than these, for those do not enquire wisely concerning this."